



## **Sawyer Products – In-line Filter**

www.sawyerproducts.com

### **Device Information**

The Sawyer In-line filter is designed for use with commercial hydration packs. The In-line filter contains a filter cartridge similar to the primary filter in Sawyer's water bottle, a 0.2  $\mu\text{m}$  hollow fiber filter. The filter cartridge is contained in a sturdy plastic housing with separate inlet and outlet for connecting to the drink tube of a hydration pack or other tubing for fluid transfer. The hollow fiber filter is a 0.2  $\mu\text{m}$  polysulfone hollow fiber filter. The hollow fibers are packed into a plastic housing and the open ends are oriented at the effluent side of the housing. Water flows into the filter housing, from the outside of the hollow fibers to the inside, then out the open ends into the drink spout. The top of the hollow fiber filter cartridge is sealed with a hard epoxy with the open end of the hollow fibers flush with the epoxy surface; this forces water to flow into the hollow fibers. Cleaning and storage directions are also provided. Cleaning the filter prior to long term storage or after extended use consists of adding 4 drops of chlorine bleach to 1 quart of clean water, flushing it through the filter, waiting 20 minutes, then draining. Storage directions require the user to dry the filter after cleaning. Directions indicate this device does not reduce viruses. Additional treatment such as the use of a disinfectant is necessary. Directions also indicate the filter should not be used in the reverse flow direction, as cross contamination may occur. The manufacturer states not to allow the device to freeze as this may damage the filter.

### **Effectiveness Against Microbial Pathogens**

No testing data, independent or otherwise, using the U.S. Environmental Protection Agency (USEPA) Guide Standard and Protocol for Testing Microbiological Water Purifiers (reference 1) was received for this device. Independent testing data was obtained from the manufacturer website showing bacteria, *Giardia*, and *Cryptosporidium* reduction (reference 2). Results showed > 6-log reduction in bacteria and > 5-log reduction in cysts using 100 mL of pathogen spiked "stream" water. The data received and general knowledge of membrane filtration (references 2 and 3) indicate that this device should be capable of consistently meeting the minimum 6-log bacteria reduction and 3-log reduction for *Giardia* cysts and *Cryptosporidium* oocysts stated in the USEPA Protocol. It is not expected to consistently reduce viruses (4-log reduction). Based on general knowledge of size exclusion by membrane filtration, the Sawyer In-line filter is assigned one  $\checkmark$  for bacteria reduction, one  $\checkmark$  each for the reduction of *Giardia* cysts and *Cryptosporidium* oocysts. The device receives an X for virus reduction (for an explanation of the rating checks [click here](#)).

**Table. Expected Performance Against Microbial Pathogens.**

Microbial Pathogen Type	Expected Disinfection Capability	Evaluation Rating	Primary Pathogen Reduction Mechanism
Bacteria	>6 log	√	size exclusion
Viruses	>4 log	X	-
<i>Giardia</i> cysts	>3 log	√	size exclusion
<i>Cryptosporidium</i> oocysts	>3 log	√	size exclusion

Production Rate and Capacity

Inherent to the production rate and capacity of filtration devices is the quality of the raw water source. Because it is an in-line filter, the actual production rate is dependent on the user. The manufacturer states a flow rate of 1.8 L/min using a hydration pack and 0.63 L/min using gravity flow. The production capacity of the device is stated to be up to 950 L. However, production capacity will vary widely with raw water quality (e.g., turbidity).

Cleaning, Replacement, and End of Life Indicator

This device cannot be backwashed to remove sediment from the filter. When the device becomes unusable due to decreased production rate, the clogged filter must be replaced. For practical purposes, the filter cartridge is not cleanable. The device contains no end of life indicator short of filter clogging.

Weight and Size

Dry weight (filter cartridge only, no tubing)	100 g. (estimated)
Size (height x diameter)	13 cm x 5 cm

Cost

In-line filter	\$35.00
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Device Evaluation

No data was received that challenged the Sawyer In-line filter against the USEPA Protocol (reference 1). The limited data obtained from the manufacturer website, as well as general knowledge of size exclusion by membrane filtration, indicate that the device should be capable



of consistently reducing bacteria, *Giardia* cysts and *Cryptosporidium* oocysts to the required minimum log reductions stated in reference 1. The testing data received was for challenging the device against 100 mL of pathogen spiked water. This data gives no indication of the long term efficacy of this filter against pathogens or turbid water. This device is not expected to consistently reduce viruses (4-log). Additional treatment is necessary to remove viruses such as adding a disinfectant (e.g., chlorine, iodine, chlorine dioxide) to the water after filtration. This device contains no prefilter and therefore, is highly susceptible to clogging when used with turbid water. Since the device is not able to be backwashed to remove accumulated particles, once clogged, the filter must be replaced. There is no indicator of process failure or end of device useful life.

### Advantages

- Expected to consistently provide adequate protection from bacteria, *Giardia* cysts and *Cryptosporidium* oocysts, although device-specific testing data using the USEPA Protocol is not available.
- No wait time prior to consumption.
- Simple and effective.

### Disadvantages

- No data testing this device against the USEPA Protocol (reference 1).
- Not expected to be consistently effective against viruses.
- No prefilter. Reduced production capacity when using high turbidity water.
- Not backwashable.
- No real-time indicator of process failure.

### References

1. USEPA, 1989. Guide Standard and Protocol for Testing Microbiological Water Purifiers. *Federal Register*. 54:34067.
2. Laboratory challenge data obtained from the manufacturer website.
3. U.S. Army Center for Health Promotion and Preventive Medicine, 2005. *Technical Information Paper; Filtration in the Use of Individual Water Purification Devices*, Aberdeen Proving Ground, MD.

